Software Project Management
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Lecture – 54
SEI CMM (Contd.)

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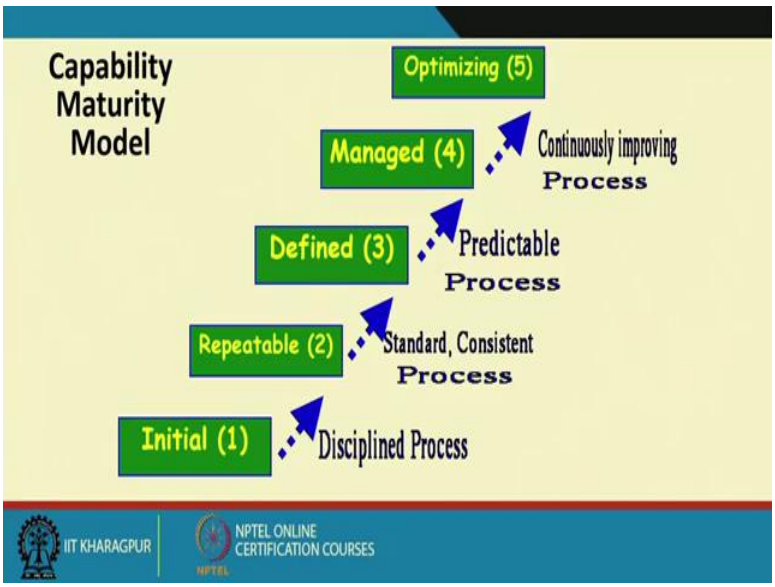

Welcome to this lecture. In the last lecture, we were discussing about the SEI, CMM quality model. We had said that this was set up by the Software Engineering Institute at the Carnegie Mellon University, on a request from the department of defense. The department of defense wanted to assess the capability of its vendors the likely performance of the vendors before awarding the contract. But then it had significant benefits for the organizations themselves. It helped them to improve the quality of their work, meet the schedules and also develop in a cost effective manner.

And therefore, it is widely accepted, world wide it helps the organizations to improve its quality in stages. We are just discussing this model here where the level 1 is called as the initial model. All organizations by default are at initial, even if they do not have any documented process they do ad hoc build and fix for all these they are at initial level, every organization by default is at the initial or level 1.

And to go to the level 2, they must have a disciplined process. A disciplined process is that they must be using some process. They must be having project plans made,

monitoring against the plan, there must be a proper project manager who makes plans, monitor against these plans, configuration management of the documents and so on. And then it goes to the repeatable level. This is level 2, the implication of the repeatable as we are mentioning is that an organization can repeat its success on one project on similar projects in the future.

That is if we did a job that was awarded to it well, then it can repeat its success on that project on similar projects. The third level is called as defined level. In the defined level, the process must be documented in the repeatable it is a standard consistent process. In the repeatable level, it is a disciplined process and then in the defined level the process must be documented, so that the process is used consistently by all members.

In the initial level the process there is no disciplined process, everybody is free to use their own process, even build and fix there are no process, only build and fix, that is also would qualify for initial. In the repeatable there must be a disciplined process that is the process must be followed by different developers, but there may be variation in the process, their understanding a process may vary.

But in level 3 there is a standard consistent process, only then they get to level 3 and to get a standard consistent process, the process has to be documented, it has to be defined what exactly is the process. Here in the disciplined process and the repeatable, the project management is there and also the process is disciplined, everybody have the process in their mind, but then there can be variation across the different developers. But in the level 3, there is a standard consistent process and this can be achieved only when the process is documented.

In the level 4, its necessary to have a predictable process that is the process performance needs to be measured and then whether the goals that are there are met this is identified and corrective actions are taken if the goals are not met. For example, let us say one of the process metric or process measurement is how effective is the review where most of the bugs identified in the review process or they got identified during testing and that measurement is tracked and if there are very few bugs which are identified during the review and most of the bugs got identified in the testing.

Then it was identified that why the review was not effective and therefore, it was enforced more thoroughly may be the review was not done properly and that is why most

of the bugs they escaped to the testing. From the managed go to the optimizing, the organization must have a continuously improving process.

Now, let us see the same example that if there are bugs identified, the number of bugs identified in the review versus the number of bugs identified in the testing if it was identified that review was not very effective in a managed stage it would be investigated that why the review was not effective. Maybe it was not followed rigorously, may be the people who reviewed they just were lacks could not review properly and so on.

Whereas in the optimizing level, it was also identified that whether the review process itself is not proper; does the review process needs improvement and the process may be changed here. So, in the managed stage the metrics are collected, the process metrics are collected to investigate and find out why the targets were not met, what was the short coming on the part of the team members who were using the process.

Whereas, in the optimizing level it is also identified that does the process itself needs improvement and then the improvements are made to the process. So, that is the overall idea here in the capability maturity model that the initial all organizations quality, this is also called as a chaotic organization where everybody all developers are free to develop their own way chaotic activity, that is the hallmark of the initial level.

In the repeatable processes are followed, but then there can be variation across the process different team members. The project management is followed. And then the next level three is the defined process where the process is defined and documented. The managed level, the process performance metrics are collected and these are used to identify why the targets are not met, why certain things were not working certain activities were not satisfactory, but the process is not changed based on the metrics.

Whereas, in the optimizing the process continuously improves. The documented process every time necessary it keeps on improving.

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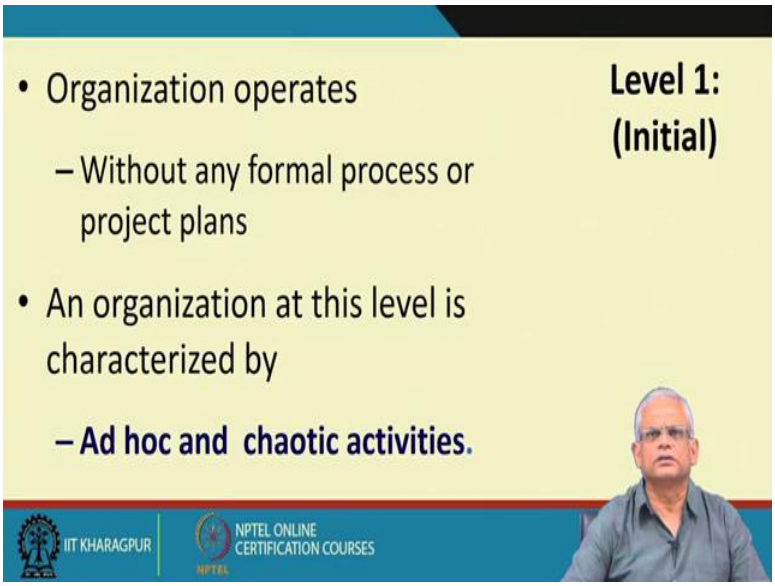

The level 1 is the initial level. Here every organization by default qualifies to be level 1 there are no process requirement, no project plans required. So, every organization just developers got together developing and that is will qualify the level 1 or the initial. The hallmark of a level 1 organization if a organization if qualified at level 1, then the projects are done ad hoc, the developers are free to do whatever ad hoc and chaotic activities this is the hallmark of a level 1 organization.

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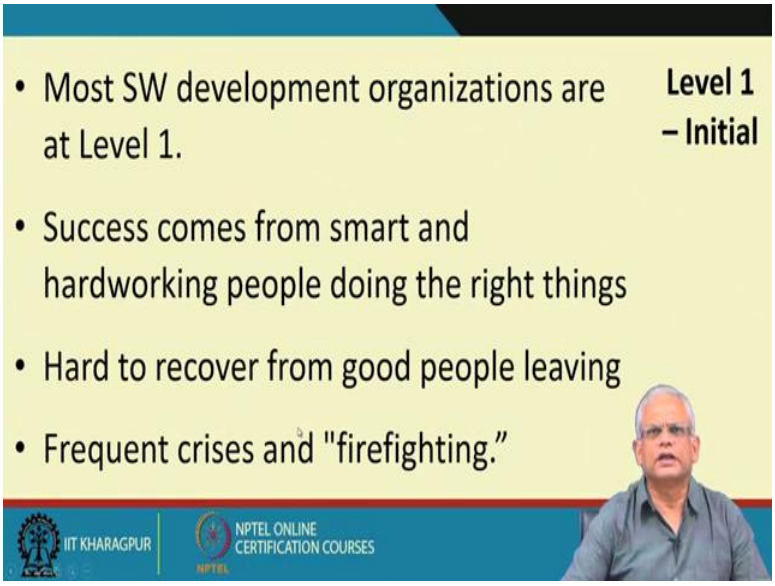

But the thing is that many software organizations they are at level 1. They, the developers there are free to do whatever way they want to develop software. Success comes from smart people and hardworking people doing the right things. If a level 1 organization has a success in a project its largely attributed to some of the team members who had worked overtime, who are doing smartly getting some things right and so on.

But then this kind of organization get can get into big problem if during the project some of those good people leave, then the project there will be a total failure. And this kind of organization during the project tenure there are frequent crisis and the good people the calm down in a firefighting mode, let us say some module is not working, the good people the smart people the those are there in the team. They take up those activities help out and bring the project to success.

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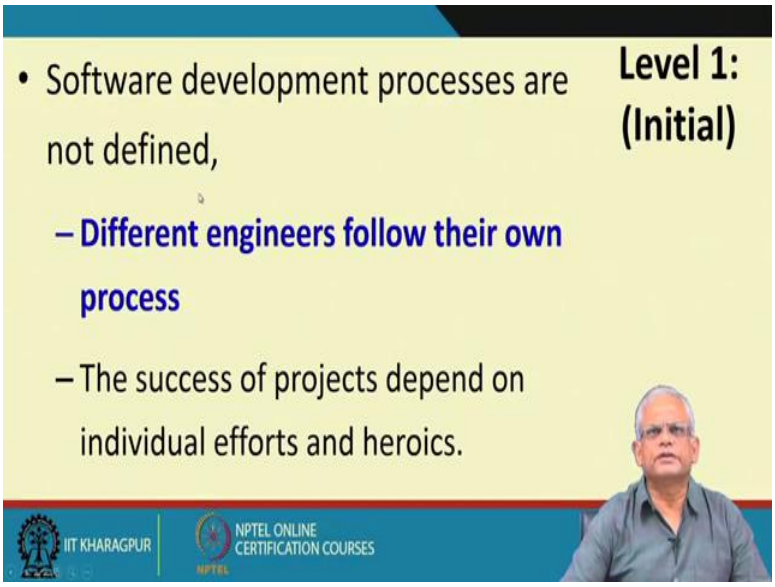

Here there are no specific process followed. Different engineers have their own understanding of their process, they may not follow any process and the success of the project depends on the individual effort and heroics.

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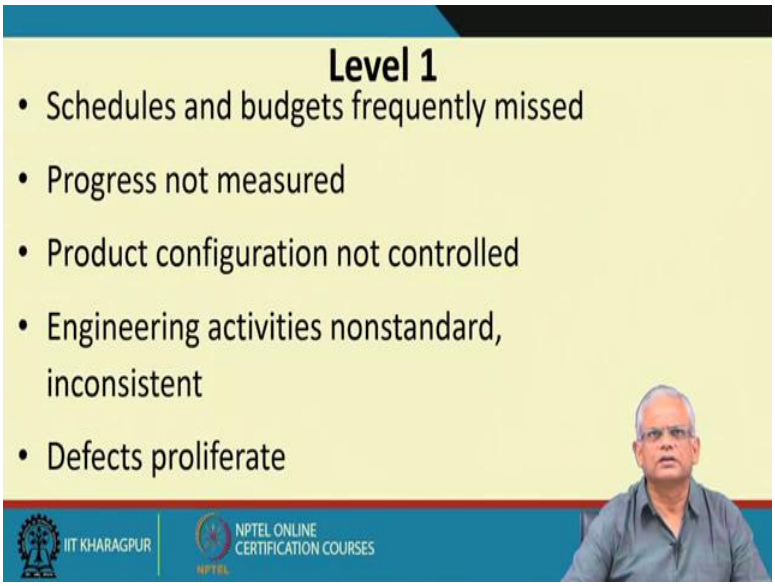

The schedules and budges are missed. Progress is not measured, there are no plans made there are no progress measurement. And that is one of the major reason why the schedules are missed because to start with and not made any plan that what work will be complete by what date and so on. Also the product configuration is not controlled.

It is likely that buggy software where the bug was fixed, but still the buggy version was forwarded to a customer. The activities that the developers take a nonstandard inconsistent and there are large number of defects in this kind of software developed by a level 1 organization.

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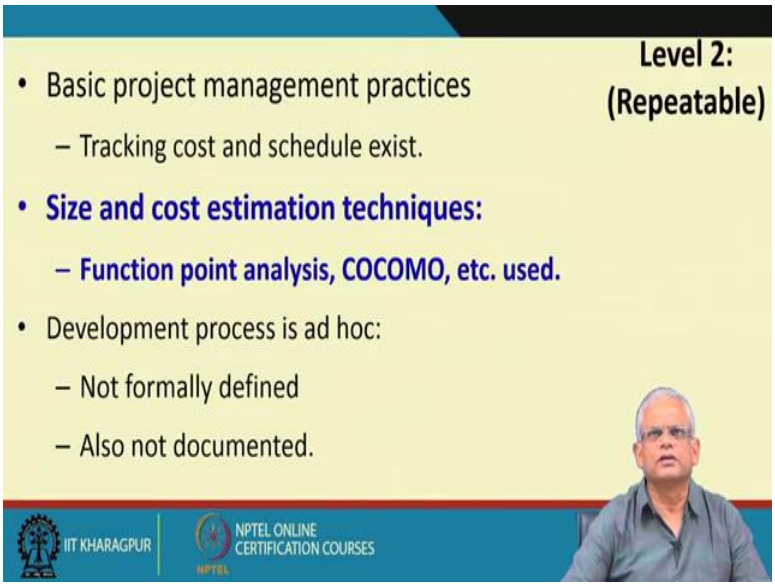

The level 2 is called as a repeatable level because here the basic process framework is in place and some of the basic requirements are in place and therefore, an organization at level 2 if it has a success in a project it can repeat its success on a similar project. If it developed a payroll software successfully for some organization and another payroll software it can with success develop or some other organization.

One of the major requirement of the level 2 is project management practices that is making the basic plans and then monitoring against the plan, tracking the cost and schedule. Size and cost estimation techniques are done by the project manager function point analysis, COCOMO etcetera these are used. But again here the developers though they have their process, they do not use a build and fix.

They have their process, but these are not formally defined. There may be variation of the process that are used by different developers and also these are not documented.

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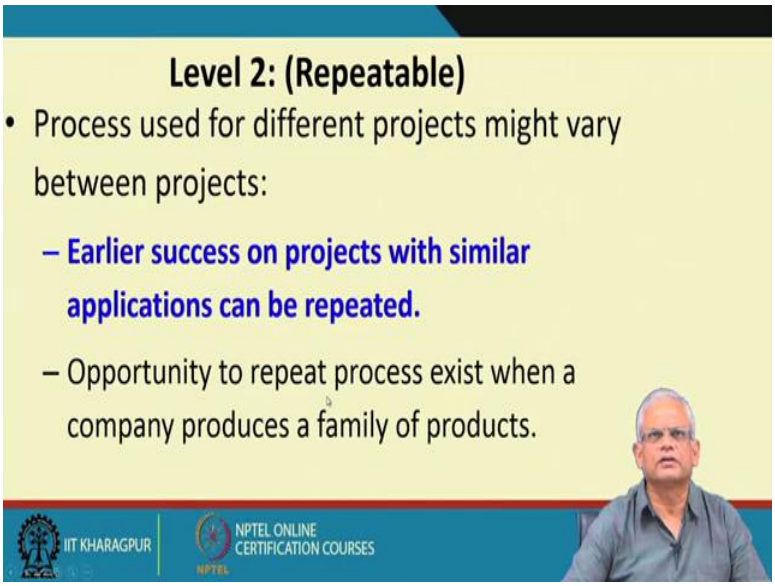

Also the process that is used for different projects may be different and here the success on a project can be repeated on a similar project and if a organization produces a family of products then a level 2 organization, is it is possible for a level 2 organization to repeat its success on one product across the family of products.

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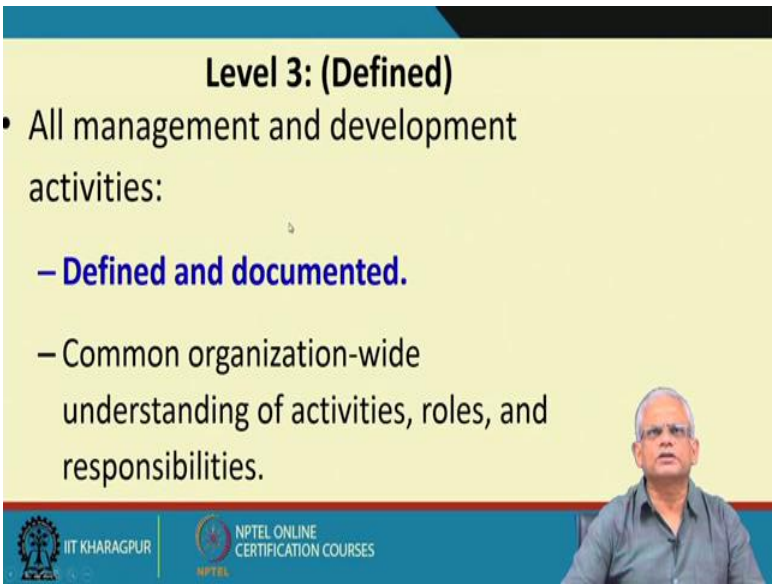

In level 3, the process is defined and documented and therefore, there is a consistent process that is followed by all developers. There is a common organization wide

understanding of what are the activities to be done at what time, what are the roles, what are the responsibilities.

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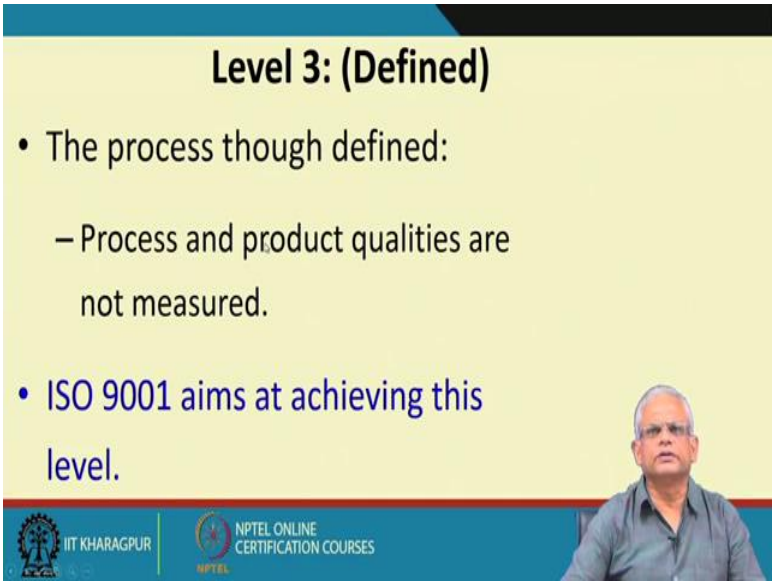

But then even though the process is defined. But then there are no process measurements are done and roughly ISO 9001 is at level 3. But ISO 9001, the 2000 version that targets for level 5, but the original ISO 9000, 1987 is roughly at the level 3 of the SEI, CMM model.

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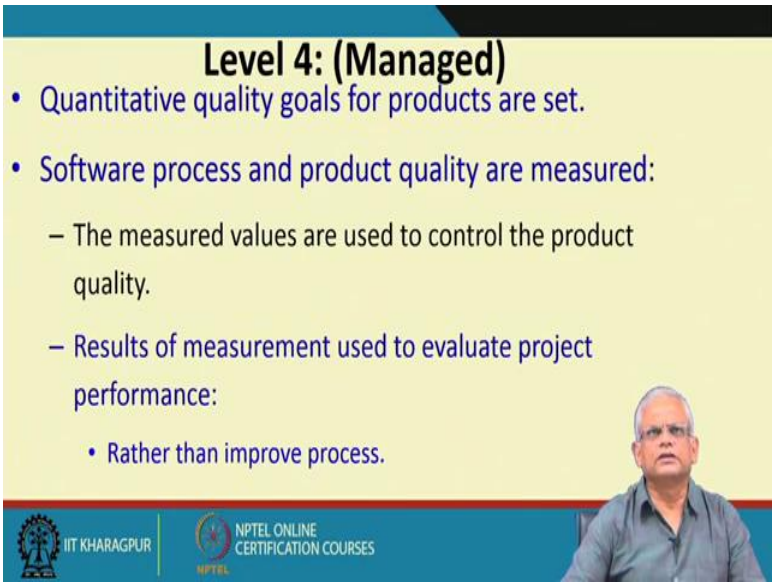

In the level 4 here, there are quantitative quality goals for the product are set. For example, that how many bugs per 100 lines or 1000 lines should be there in the final product. After all the testing is complete all the development and testing is complete all the development and testing is complete what is the quality goal for the number of bugs per 1000 line or what percentage of bugs to be identified during the inspection process and what percentage to be identified by the testing process?

Here these kind of process and product qualities are measured and if this fall short, then these are used to improve the project performance that is some things were not done properly. And it was used to give this feedback to the team that you did not do a proper review or a proper testing was not done. This has to be done more rigorously. So, the project performance is enhanced and not the process itself. The no change to the process is made, but then the process that exist are used more rigorously to improve the performance.

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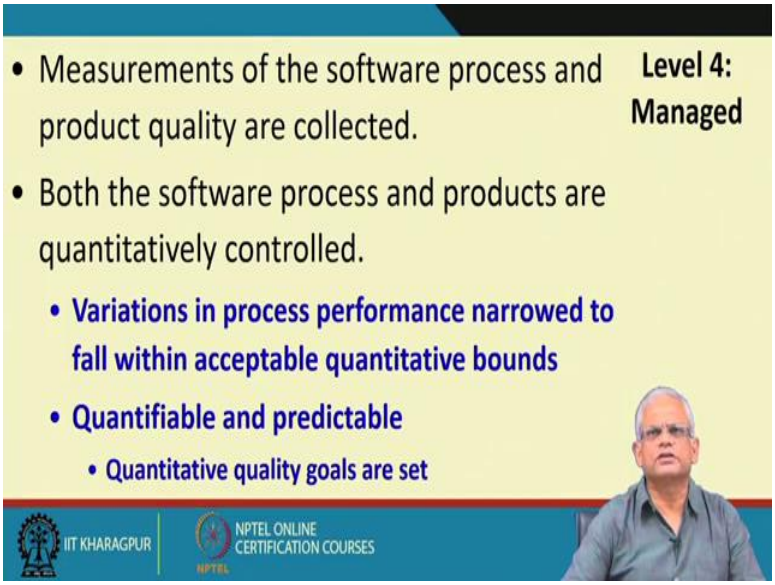

And level 4, the process and product quality are collected and the software process and product are quantitatively controlled and variation of the process performance is narrowed to fall into acceptable quantitative bounds. That if let us say during inspection 50 percent of the bugs must get detected and should not go to the testing stage, then more or less all projects the same thing happens that is all projects do the inspection

rigorously. Here quantitative quality goals are set and therefore, the quality is quantifiable and predictable.

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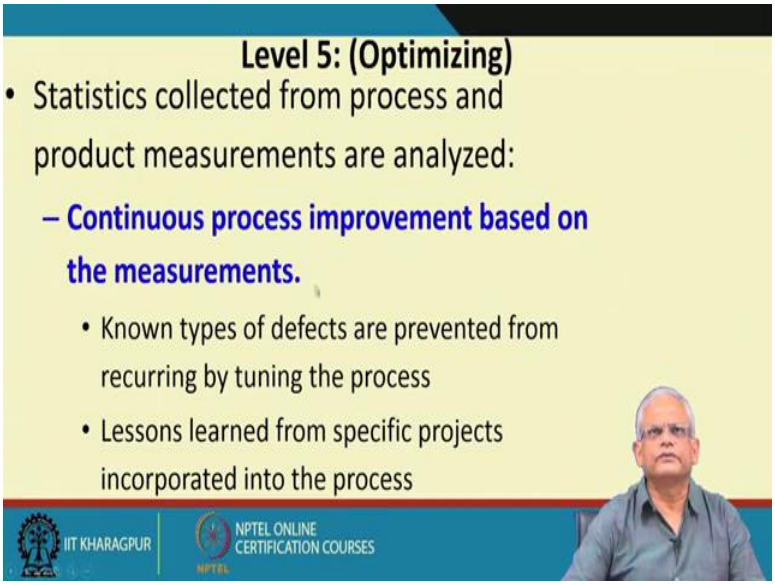

In the level 5, the measurements are used not only to enforce the process is followed rigorously, but also it is identified whether the process itself needs improvement because it may so happen that the review is done rigorously, but then the number of defects getting detected during the review is not satisfactory. Then the review process may need to be improved and therefore, the process keeps on improving continuously based on the measurements.

If there are some known problems with the process, then the process is fine-tuned and the lessons learned into some specific project learn from specific projects these are incorporated in the process, so that these good things that some project used and got very positive results, these can be used organization wide and therefore, the process itself is changed.

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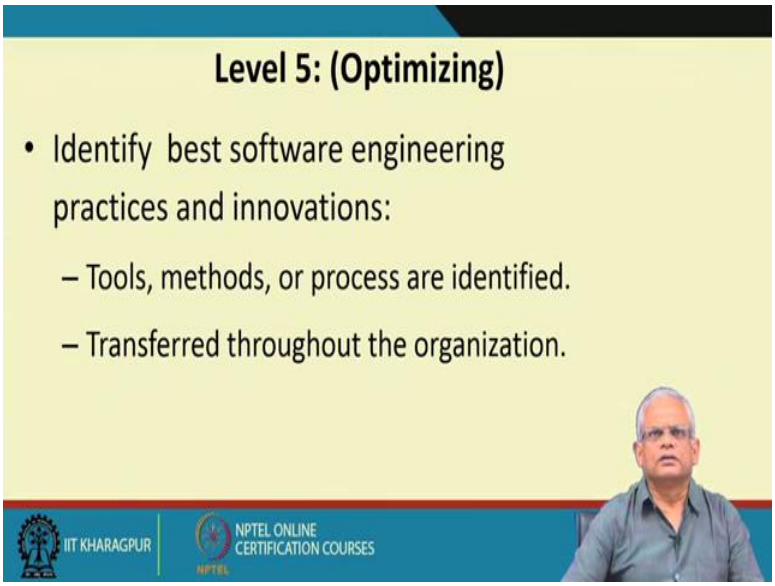

Not only that, there are lot of innovations and improved practices are being reported across different organizations, in the journals, magazines and so on. These tools methods and processes are identified, there is a special team here in a level 5 organization whose work is to find out if there are improved methods tools and processes which are reported then these are incorporated into the process itself and these are transferred throughout the organization.

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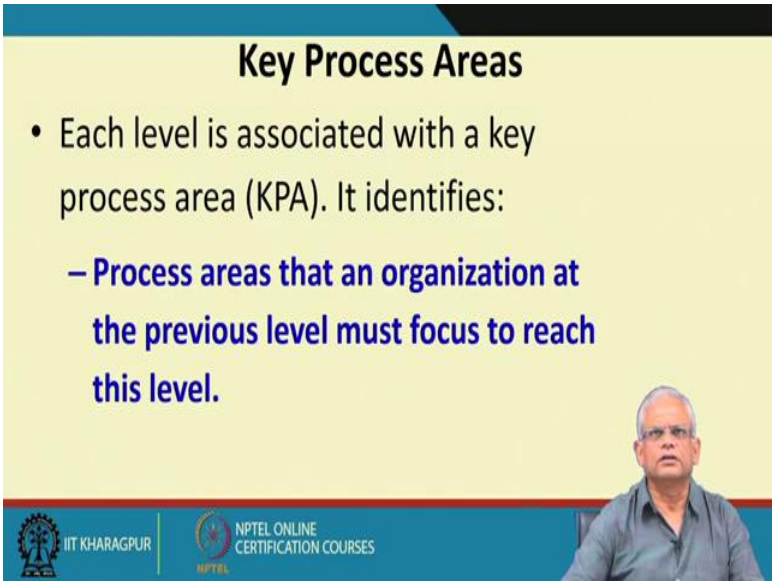

Now, let us discuss about another important aspect of the SEI CMM which is the key process areas. As you might have already noted that the ISO 9000 is a go, no go scenario, either a organization qualifies for ISO 9001 or it does not. But here in the SEI CMM when organizations get assessed at certain level and then it tries to go to the next level, and there are set of things that have been identified that organization at one level to go to the next level and that is called as the key process areas, some part of the process that needs to improved.

The KPA is a important aspect of the CMM model. An organization assessed at certain level it can go to the next level if it satisfy some key process areas. These are the process areas that an organization at some level must focus to reach the next level or let us say level 3 KPA, it identifies the process areas which a level 2 organization must focus to reach to the third level.

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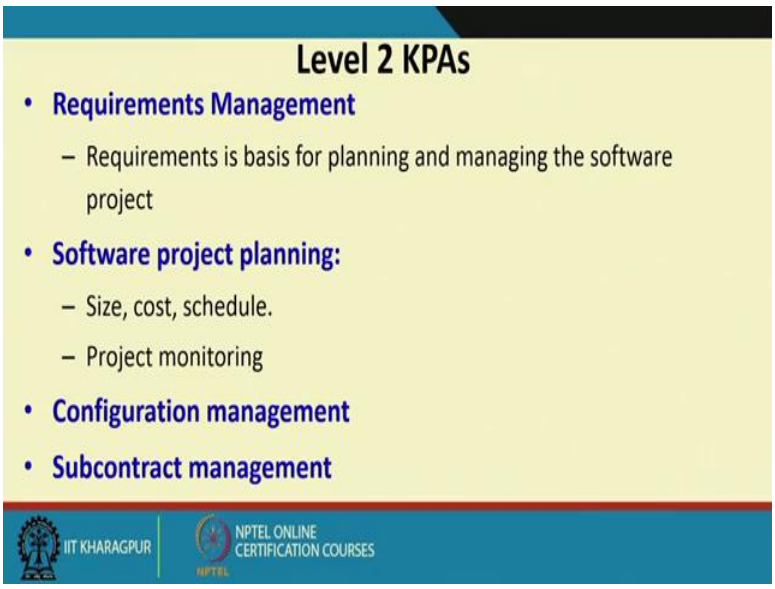

Now, let us see what are the KPAs for the different levels. For level 1 there are no KPAs because every organization is by default in level 1 and KPAs are those process areas which an organization must focus to come to that level. The level 2 KPAs are the process areas which a level 1 organization must focus to come to level 2. These are the KPAs requirements management, the requirements document must be written and managed.

If the software project planning, there has to be a project manager plans have to be made estimates have to be made, based on that plans to be made and based on the plan the

project monitoring has to be done. The third requirement is configuration management. The configuration management allows a document to be controlled, only the authorized persons can change it and also it will be possible to identify the latest version of the document easily and also it will be possible to go back to a previous version and subcontract management.

So, these are some of the process areas that a level 1 organization must focus to come to level 2. Must have proper requirements document, because requirements are the basis for planning and managing. There has to be a project manager who does project planning, project estimations and monitoring and control based on the plan.

Configuration management must be used. Without configuration management an organization will not satisfy level 2. And also subcontract management for awarding work to a vendor from the project some part of the work may be given to a vendor, but then the work that is given to the vendor must be properly identified, reviewed and the item that are completed by the vendor must be properly tested to comply with the requirements that was given to the contractor.

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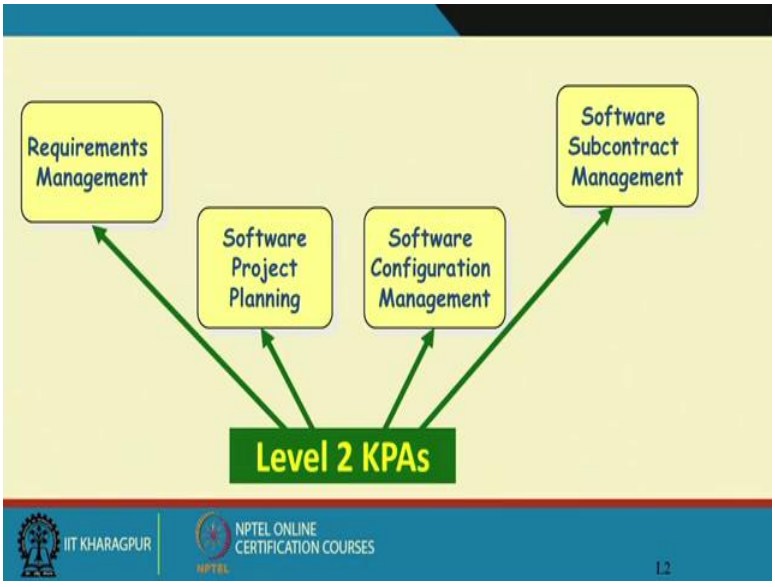

We can pictorially describe what are the KPAs per level 2, one is the requirements management. The requires, the requirements must be obtained and this must be put under configuration management because requirements keep on changing. Software project planning monitoring and control, this is another KPA software configuration

management. This is also an important KPA and subcontract management, this is another KPA.

We are almost at the end of this lecture. We will look at the KPAs for the other levels of the SEI CMM in the next lecture and we will move on from there.

Thank you.